

#### PATENT APPLICATION

#### IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Docket No: Q77482

GROSS, Abraham, et al.

Appln. No.: 10/660,730

Group Art Unit: 1722

Confirmation No.: 4923

Examiner: unknown

Filed: September 12, 2003

For:

MULTIPLE BEAM MICRO-MACHINING SYSTEM AND METHOD

### <u>INFORMATION DISCLOSURE STATEMENT</u> <u>UNDER 37 C.F.R. §§ 1.97 and 1.98</u>

Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450

Sir:

In accordance with the duty of disclosure under 37 C.F.R. § 1.56, Applicant hereby notifies the U.S. Patent and Trademark Office of the documents which are listed on the attached PTO/SB/08 A & B (modified) form and/or listed herein and which the Examiner may deem material to patentability of the claims of the above-identified application.

One copy of each of the listed documents, other than any U.S. patents and patent publications, is submitted herewith.

The present Information Disclosure Statement is being filed: (1) No later than three months from the application's filing date; (2) Before the mailing date of the first Office Action on the merits (whichever is later); or (3) Before the mailing date of the first Office Action after filing a request for continued examination (RCE) under §1.114, and therefore, no Statement under 37 C.F.R. § 1.97(e) or fee under 37 C.F.R. § 1.17(p) is required.

INFORMATION DISCLOSURE STATEMENT

U.S. Appln. No.: 10/660,730

The submission of the listed documents is not intended as an admission that any such document constitutes prior art against the claims of the present application. Applicant does not

waive any right to take any action that would be appropriate to antedate or otherwise remove any

listed document as a competent reference against the claims of the present application.

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Respectfully submitted,

William H. Mandir

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23373

CUSTOMER NUMBER

Date: December 23, 2003

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INFORMATION DISELOSURE STATEMENT BY APPLICA

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U.S. PATENT DOCUMENTS								
		Document N	lumber	Publication				
Examiner Initials*	Cite No. <sup>1</sup>	Number	Kind Code <sup>2</sup> (if known)	Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document			
		US 6,252,667		Jun 26, 2001	Hill et al.			
		US 6,295,171		Sep 25, 2001	Chao et al.			
		US 4,258,468	-	Mar 31, 1981	Balde			
		US 6,313,918		Nov 6, 2001	Hill et al.			
	*	US 5,933,216		Aug 3, 1999	Dunn			
		US 5,674,414		Oct 7, 1997	Schweizer			
		US 6,040,552		Mar 21, 2000	Jain et al.			
		US 6,037,564		Mar 14, 2000	Tatah			
		US 60/387,911		Jun, 2002	Gross et al.			
		US 4,447,291		May 8, 1984	Schulte			

FOREIGN PATENT DOCUMENTS										
Examiner Initlals*		For	eign Patent Docu	ment	Publication					
	Cite No. <sup>1</sup>	Country Code <sup>3</sup>	Number <sup>4</sup>	Kind Code <sup>5</sup> (if known)	Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Translation 6			
		wo	0064623		Nov, 2000	GSI Lumonics Inc.				
		EP	1224999		Apr, 2001	Sumitomo Heavy Industries				
		WO	03071344		Aug 28, 2003	Orbotech Ltd.				
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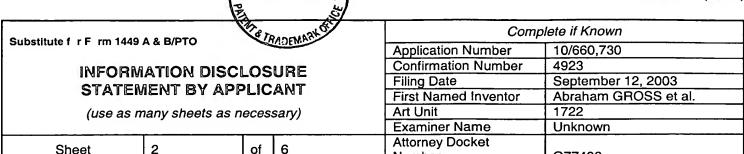
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			Mignardi et al. "The Digital Micromirror Device – a Micro-Optical Electromechanical Device for Display Applications", MEMS and MOEMS Technology and Applications, SPIE Press, 2000	
			Owen, Mark, New Technology for Drilling Through -and Blind-Vias in Copper Clad Reinforced Circuit Boards, IPC Proceedings, May 1995.	
			Lee, Rex A. and Moreno, W.A., Excimer vs. ND:YAG Laser Creation of Silicon Vias for 3D Interconnects, IEEE, 1992, pp. 358-360.	
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		Document I	lumber	Publication	
Examiner Initials*	Cite No. <sup>1</sup>	Number	Kind Code <sup>2</sup> (if known)	Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
		US 5,789,121		Aug, 1998	Cywar et al.
		US 5,614,114	·	Mar, 1997	Owen
		US 5,841,099		Nov, 1998	Owen et al.
-		US 5,593,606		Jan, 1997	Owen et al.
		US 3,594,081		Jul, 1971	Tschink
		US 5,676,866		Oct, 1997	In den Bäumen et al.
		US 5,690,845		Nov, 1997	Fuse
		US 5,948,291		Sep, 1999	Neylan et al.
		US 6,058,132		May, 2000	Iso et al.
		US 6,420,675		Jul, 2002	Lizotte et al.
		US 6,011,654		Jan, 2000	Schweizer et al.
		US 4,838,631		Jun, 1989	Chande et al.
•		US 4,950,862		Aug, 1990	Kajikawa
		US 5,113,055		May, 1992	Kuriyama
		US 5,585,019	_	Dec, 1996	Gu et al.
		US 6,310,701	1	Oct, 2001	Lizotte et al.

			F	OREIGN PA	TENT DOCUMEN	NTS	
		Foreign Patent Document			Publication		Tuesseledies
	Cite No. <sup>1</sup>	Country Code <sup>3</sup>	Number <sup>4</sup>	Kind Code <sup>5</sup> (if known)	Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Translation 6

		OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS	
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Cite No. <sup>1</sup>	Number	Kind Code <sup>2</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
	US 6,515,257		Feb 4, 2003	Jain et al.
	US 5,404,247		Apr 4, 1995	Cobb et al.
	US 5,948,288		Sep 7, 1999	Treves et al.
	US 5,408,553		Apr 18, 1995	English Jr. et al.
	US 6,233,044		May 15, 2001	Brueck et al.
	US 3,594,081		Jul 20, 1971	Tschink
	US 5,055,653		Oct 8, 1991	Funami et al.
	US 5,302,798		Apr 12, 1994	Inagawa et al.
	US 5,973,290		Oct 26, 1999	Noddin
	US 6,184,490		Feb 6, 2001	Schweizer
	US 6,573,473		Jun 3, 2003	Hunter et al.
	US 20030019854		Jan 30, 2003	Gross et al.
	US 20030168434		Sep 11, 2003	Gross et al.
	US 6,172,331		Jan, 2001	Chen
	US 6,491,361		Dec, 2002	Spann
	US 6,566,627		May, 2003	Brandinger et al.
	US 4,038,108		Jul, 1977	Engel et al.

		F	OREIGN PA	TENT DOCUME	VTS	
	Foreign Patent Document			Publication		
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		OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS			
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Examiner Initials*	Cite No. <sup>1</sup>	Number	Kind Code <sup>2</sup> (if known)	MM-DD-YYYY	Name of Patentee or Applicant of Cited Document		
		US 6,483,071	B1	11/19/2002	Hunter et al.		
		US					
		US					
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			F	OREIGN PA	TENT DOCUMEN	ITS	
Examiner	Cite	Foreign Patent Document			Publication Date	Name of Patentee or	
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		"Dopant-Induced Excimer Laser Ablation of Poly(tetrafluoroethylene)," Applied Physics						
		B:Photo-Physics and Laser Chemistry, Mar. 92, vol. b54, No. 3, C R Davis et al, pp. 227-230.						
		"Etch-Stop Polymer Machining with an Argon Ion Laser," IBM Technical Disclosure Bulletin, Jan. 1993, vol. 36., No. 1, Armonk, NY, US, p. 254.						
		Pete Singer, "The Interconnect Challenge: Filling Small, High Aspects Ratio Contact Holes,"						
		Semiconductor International, Aug. 1994, pp. 57-64.						
		"Printed Circuit OperationsA View from Inside," Unisys.						
		Richard Harris et al., "MCM Micromachining: Nd:YAG UV Laser Process is a New Option," Electro Scientific Industries, Inc., Spring 1993.						
		"LaserPulse," Electro Scientific Industries, Inc., Fall 1993, pp. 1-7.						
		Y. S. Liu, "Laser Metal Deposition for High-Density Interconnect," Optics & Photonics News, Jun. 1992, pp. 10-14.						
		Friedrich G. Bachmann, "Large scale industrial application for excimer-lasers; via-hole-drilling by Photo-ablation," SPIE, vol. 1361, Physical Concepts of Materials for Novel Optoelectronic Device Applications, 1990, pp. 500-511.						
		Hans-Ulrich Krebs and Olaf Bremert "Pulsed laser deposition of thin metallic alloys", Applied Physics Letters Vol. 62(19) pp. 2341-2343. May 10, 1993						

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		Brannon, J.H., "Excimer-Laser Ablation and Etching," Circuits & Devices magazine, Sep. 1990						
		pp. 19-24.	<u> </u>					
		Cole, H.S., Liu, Y.S., and Philipp, H.R., "Dependence of photoetching rates of polymers at 193						
		nm on optical absorption depth," Appl. Phys. Lett., vol. 48, No. 1, 6 Jan. 1986, pp. 76-77.						
		Dyer, P.E., and Sidhu, J., "Spectroscopic and fast photographic studies of excimer laser polymer						
		ablation," J. Appl. Phys. 64 (9), 1 Nov. 1988, pp. 4657-4663.						
		4420 Laser Micromachining System -ESI Brochure (2 pages), Sep. 1993.						
		Ewing, J.J., "Advanced solid-state lasers challenge conventional types," Laser Focus World, Nov. 1993, pp. 105-110						
		Hobbs, Jerry R., "Electronics makers switch to precise micromachining tools," Laser Focus World, Mar. 1994, pp. 69-72.						
		Lee, Rex A. and Moreno, W.A., Excimer vs. ND:YAG Laser Creation of Silicon Vias for 3D Interconnects, IEEE, 1992, pp. 358-360.						
		Liu, Y.S., Cole, H.S., and Guida, R., "Laser ablation of polymers for high-density interconnect," Microelectronic Engineering 20 (1993) 15-29, 1993 Elsevier Science Publishers B.V., pp. 15-29.						

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		Mahan, G.D., et al. "Theory of polymer ablation," Appl. Phys. Lett. 53 (24), 12 Dec. 1988, pp. 2377-2379.				
		Owen, Mark, New Technology for Drilling Through -and Blind-Vias in Copper Clad Reinforced Circuit Boards, IPC Proceedings, May 1995.				
		Srinivasan, R., and Braren R., "Ultraviolet Laser Ablation of Organic Polymers," Chemical Reviews, 1989, vol. 89, No. 6.				
		Tessier, Theodore G. and Chandler, Jerry, "Compatibility of Common MCM-D Dielectric with Scanning Laser Ablation Via Generation Processes," IEEE (1993), pp. 39-45.				
		"Trepanning Moves in on Mini Holes," Machinery and Production Engineering, 2 Nov. 1983, pp. 42-43.				
		Wiener-Avnear, Eli, "Lasers cut microscopic paths with major potential," Laser Focus World, Jul. 1993, pp. 75-80.				
		Wu et al., "Single-Shot Excimer Laser Ablation of Thick Polymar Desists on Metallic Substrates," AMP Journal of Technology, vol. 1, Nov. 1991, pp. 69-79.				
		Martyniuk J., "UV Laser-Assisted Wire Strippping and Micromachining", AMP Journal of Technology, vol. 4, Jun. 1995.				
		"Laser-Induced Plated Through-Holes," IBM Technical, Disclosure Bulletin, Oct. 1968, vol. 11, No. 5, H.R. Potts and C.A. Speicher, p. 540.				
	**	ESI "Model 4570 Series Lasers Service Guide", Feb, 1994,				

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